



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/708,372 | 02/26/2004 | ERH-KUN LAI | 12680-US-PA | 2371 |

31561 7590 09/26/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

WARREN, MATTHEW E

ART UNIT PAPER NUMBER

2815

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/708,372 | LAI, ERH-KUN | |
| | Examiner | Art Unit | |
| | Matthew E. Warren | 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the RCE and Amendment filed on July 20, 2006.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 27-29 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuroda et al. (US 6,251,749 B1).

In re claim 27, Kuroda et al. shows (fig. 6B) a shallow trench isolation comprising an insulating layer (610), disposed in the trench, wherein the insulating layer has an upper surface higher than an upper surface of the substrate; a liner layer (630), formed over the substrate covering the insulating layer so that the liner layer protects the shallow trench isolation from external stress or thermal effect; and a pad oxide layer (620), directly in contact with the insulating layer and disposed between the substrate and the liner layer.

In re claim 28, Kuroda shows (fig. 6B) that the liner layer further extends to an upper surface of the substrate (since the liner extends down from the top of the upper surface of the insulating layer (610) and down toward the substrate onto the pad oxide (620)).

In re claims 29 and 31, Kuroda discloses (col. 2, lines 29-42) the shallow trench isolation is a silicon nitride layer, and thus has a low etching selectivity relative to the insulating layer (since Kuroda has the same materials and structure as the applicant's claimed invention).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroda as applied to claim 27 above.

In re claim 30, Kuroda discloses all of the elements of the claims except the thickness of the liner layer within the desired range. It would have been obvious to one of ordinary skill in the art to make the thickness of the liner within the desired range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. One of ordinary skill in the art would have been motivated to form the thickness of the liner layer having a desired thickness to form adequate protection for the shallow trench isolation.

Claims 12-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,211,022) in view of Park (US 6,479,367 B2).

In re claims 12 and 20, Lin et al. shows (fig. 2) a shallow trench isolation structure (204) comprising: a substrate having a trench therein; an insulating layer (204), disposed in the trench, wherein the insulating layer has an upper surface higher than an upper surface of the substrate; and a liner layer (212) of CVD nitride (col. 2, line 52 - col. 3, line 5) formed over the substrate covering the insulating layer. The liner layer inherently protects the shallow trench isolation from external stress or thermal effects because it has the same structure and materials as the applicant's claimed invention. Lin shows all of the elements of the claims except the insulating layer disposed in the trench being an HDP insulating layer. Park shows (fig. 3C) semiconductor device comprising a trench (36) formed in a substrate, wherein an HDP insulating material is disposed in the trench. The HDP layer has high density and superior dielectric properties (col. 6, lines 21-33).

In re claims 13 and 21, Lin et al. shows (fig. 2) that the liner extends to an upper surface of the substrate to cover it.

In re claims 14 and 22, Lin et al. inherently discloses that the liner has a low etching selectivity relative to the insulating layer because the liner is made of SiN and the insulating layer is made of oxide (col. 2, lines 52-63).

In re claims 15 and 23, Lin et al. (col. 3, lines 1-5) that the liner has a thickness of 180 Angstroms, which fits the range listed in the claim.

In re claims 16, 17, and 24, Lin et al. discloses that the liner is an insulating layer of silicon nitride (col. 2, lines 52-63).

In re claims 18 and 25, Lin et al. shows (fig. 2) that a pad oxide (204) is formed between the liner and the substrate.

In re claims 19 and 26, Lin et al. shows (fig. 2) that another insulating layer (216) covers the liner layer.

Response to Arguments

Applicant's arguments with respect to claims 12-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2815

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew E. Warren



September 19, 2006